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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Serial No.: 10/789,112 Confirmation Number: 7586
Applicant: Ching-Wei Chang
Filed: February 26, 2004 Date of Appeal Brief: March 6, 2008
Group #: 2609
Examiner: Jamares Washington

Docket No: J-SLA.1477
Customer No: **55428**
For: Dot-Gain Reduction Method For Multi-Level Halftoning

MS Appeal
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Sir:

APPEAL BRIEF UNDER 37 C.F.R. §41.37

In support of the appeal to the final rejection of the claims in the above-referenced application, dated November 16, 2007, and the Notice of Appeal, filed January 28, 2008, Appellants respectfully submit the following Appeal Brief.

1. Statement of the Real Party in Interest under 37 C.F.R. §41.37 (c)(1)(i)

The real party in interest is Sharp Laboratories of America, Inc., having a place of business in Camas, Washington.

2. Status of Related Appeals and Interferences under 37 C.F.R. §41.37(c)(1)(ii).

There are no related Appeals or Interferences.

3. Status of all Claims under 37 C.F.R. §41.37(c)(1)(iii).

Claims 1, 3 4 and 6 are pending. Claims 2 and 5 are cancelled. All claims stand rejected. All claims pending in the Application are hereby Appealed.

There are two independent claims: claims 1 and 6.

4. Status of Amendments under 37 C.F.R. §41.37(c)(1)(iv)

No amendments after final rejection have been filed.

5. Summary of the Claimed Subject Matter under 37 C.F.R. §41.37(c)(1)(v)

The method of the invention is capable of dealing with two different recognizable aspects of dot gain, one of which is referred to as *physical dot gain*, and the other of which is referred to as *optical dot gain*. Contributing to this special ability of the methodology of the invention is the approach which has been chosen for use in conjunction with creating a pixel intensity correction and calibration curve designed to equip a color-image output device to render color image data in a fashion which greatly minimizes both categories, just mentioned, of dot gain.

The invention, in this context, *focuses attention deliberately on the use of geometric pixel patterns* which are pre-selected and pre-determined, with each pattern including a central pixel, and a pre-determined geometric arrangement of neighboring pixels relative to various sides of the central pixel deployed in several specific geometric patterns. In order to develop calibration "numbers" for each color involved in the calibration process, a print is made of a large region defined by next-adjacent printed images of each one of these selected geometric patterns, one pattern at a time, with readings then made regarding this printed "calibration" material to determine the correction-relevant parameter which is referred to in the present application as percentage of printing coverage.

As there is no guidance provided by the U. S. Patent and Trademark Office as to *how* the independent claims are to be linked to the drawings and specification, Applicant has adopted the following format, which includes recitation of the independent claims, annotated with

reference numbers, figure numbers and specification page and line numbers, wherein a representation, *e.g.*, (10 Fig. 1 6/1-3) directs the reader to reference number 10 of Fig. 1, and to specification page 6, lines 1 to 3.

Claim 1. A device-specific dot-gain reducing method (1/3 - 10/12) for multi-level color-image halftoning regarding the output of a selected color-imaging multi-level halftone output device (16 Fig. 1 3/14-19 8/10-10/12) comprising

based upon observed pixel-infeed-to-halftoning-pixel-output operational characteristics of such a device (16 Fig. 1), creating a pixel-and-color-specific dot-gain reduction curve (48 Fig. 3, 68 Fig. 5 1/22-2/12 8/20-10-12) which relates, as data points for each output color of the device, selected corrections in device pixel infeed intensity to different pre-selected, specific, halftone geometric dot patterns of plural pixels including a contained subject pixel which is to be output from the device, where those dot patterns include a predetermined geometric pixel arrangement possessing (a) a central pixel, which is the mentioned subject pixel, and (b) the presence or absence of a defined collection and geometric distribution of immediately neighboring pixels, and further where those patterns collectively represent the halftone dot-pattern population characteristics of an expected halftoned color image which is to be output by the device (24-40 Figs 2, 4 4/9-8/19),

at a point in the image-processing flow of a stream of color-image pixel data which is upstream from the region where color-image device outputting takes place, and downstream from where halftoning of that data occurs, and for each pixel in the data which is to be output ultimately to become a color-visible pixel, determining in which pre-selected halftone dot pattern that pixel effectively lies and is associated as the contained subject pixel, and the output color

intended for that pixel, and then (42 Fig. 3 6/3 - 7/2),

relevant to said determining, and in relation to such a determined halftone dot pattern, appropriately applying to the associated, contained subject pixel the created dot-gain reduction curve (48 Fig. 3, 68 Fig. 5 1/22 - 2/12, 8/20 - 10/12).

Claim 6. A method (1/3 - 10/12) for minimizing color-image halftone dot-gain in the output of a multi-level halftone color-imaging output device (16 Fig. 1 3/14-19, 8/10 - 10/12) comprising

characterizing that device's halftone output, on a per-color basis, regarding geometric pixel-pattern-specific dot gain which can be related to device pixel-infeed intensity levels (20 Fig. 1 4/3-8), and

from that characterizing, creating and then applying to throughput color-image files, on a pixel-by-pixel basis, a pixel-to-device infeed intensity correction value based upon geometric pixel pattern considerations, thus to minimize device-output dot gain (24-40 Figs 2, 4 4/9-8/19, 48 Fig. 3 1/22 - 2/12, 68 Fig. 5 8/20 - 10/12).

6. Grounds of Rejection to be Reviewed on Appeal under 37 C.F.R. §41.37(c)(1)(vi)

Ground A: Claims 1, 3 and 6 stand rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 5,943,477 to Rao *et al.*

Ground B: Claim 4 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,943,477 to Rao *et al.*

7. Arguments under 37 C.F.R. § 41.37 (c)(1)(vii)

Ground A: Claims 1, 3 and 6 stand rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 5,943,477 to Rao *et al.*

As is set forth on the first page of the specification of this Application, the methodology of the present invention is capable of dealing with two different recognizable aspects of dot gain, one of which is referred to as physical dot gain, and the other of which is referred to as optical dot gain. The methodology of the invention includes creating a pixel intensity correction and calibration curve designed to equip a color-image output device to render color image data in a fashion which greatly minimizes both categories of dot gain.

The invention focuses attention deliberately on the use of geometric pixel patterns which are pre-selected and pre-determined, with each pattern including a central pixel, and a pre-determined geometric arrangement of neighboring pixels relative to various sides of the central pixel deployed in several specific geometric patterns. In order to develop calibration "numbers" for each color involved in the calibration process, a print is made of a large region defined by next-adjacent printed images of each one of these selected geometric patterns, one pattern at a time, with readings then made regarding this printed "calibration" material to determine the correction-relevant parameter which is referred to in the present application as percentage of printing coverage.

The single cited and applied reference does none of these things, and very specifically deals only with one of the two types, above-mentioned, of recognizable dot gain. Very specifically, and as the reference patent clearly points out, its proposed method of calibration (a) does not depend upon geometric considerations as that term is used by Applicant, (b) in no way deals with any preselected group of geometric patterns of pixels, and (c) features instead, as its expressly stated central contribution to the art, the practice of examining printed calibration material by looking specifically to determine the amount of ink that is deposited at a particular

central location in a grouping of pixels. This approach, at best, deals only with that aspect of dot gain which applicant has referred to as physical dot gain. Nothing specifically proposed by the reference has anything to do consciously with addressing optical dot gain. The Examiner's reliance on a text cited in '477, without providing a copy of that reference, is not proper. The Examiner's statement that such renders the correction of optical dot gain is not supported by either the reference nor by the material cited in the reference.

In Applicant's claimed invention, a color printing calibration intensity correction curve is based entirely upon calibration numbers which are derived from a practice of examining printing coverage considerations in relation to the mentioned predetermined set of geometric pixel patterns. Geometric pattern thinking, as has been stressed above, is not only foreign to the practice described by the cited and applied prior art reference, it is studiously avoided and ignored:

> The present invention generally relates to the calibration of digital printers, such as laser and ink jet printers, and, more particularly, to a method and apparatus for calibrating a printer, which method and apparatus do not depend on geometric assumptions on the printed dots. '477, Col. 1, lines 5-10.

Applicant claims the central dependence of practice of the present invention on information that can be derived from calibration use of predetermined geometric pixel patterns.

The Examiner has made several errors in the application of '477 to Applicant's claims. Initially, the Examiner states that '477 teaches a method for color printing. '477 col. 8, lines 28-51 clearly state that the '477 method of the invention illustrates a method for use with monochrome printers, and broadly describes multiple iterations for each color for a color printer. Claims 1 and 6, however, requires color input and color output, and claims specific action for

color handling. There is insufficient teaching in '477 for the reference to rise to the level of a 35 U.S. C. § 102 reference, which renders claims 1 and 6 allowable thereover.

The Examiner states that '477 3x3 matrices, in the form of lookup tables, are equivalent to Applicant's claim of geometric dot patterns of plural pixels, applying '477, col. 5, lines 31-32. Continuing on with '477 would lead one of ordinary skill in the art to read col. 1, lines 39, *et seq*, which states that the probablistic description of pixel coverage is based on consideration of all configurations in the n-neighborhood and averaging over random configurations in the peripheral n+1 neighborhood. Thus, '477 does not define the specific pixel patterns as required by Applicant's method of the invention, (...based on observed pixel-infeed-to-halftoning-pixel-output operational characteristics...); nor does '477 generate a calibration curve, instead relying on the lookup tables. '477, Fig. 3 and col. 7, lines 32-43 (partially applied by the Examiner). While it may be possible to provide a calibration curve from a lookup table, '477 does not employ this protocol, thus it is not a proper 35 U.S. C. § 102 reference, as applied to claim 1. Even the language used by the Examiner on page 3 of the Final Office action, applying '477 col. 6, lines 1-4, clearly describes use of lookup tables, and does not teach nor suggest determination of a calibration, or reduction, curve.

Finally, claim 1 requires:

> ...at a point in the image-processing flow of a stream of color-image pixel data which is upstream from the region where color-image device outputting takes place, and downstream from where halftoning of that data occurs, and for each pixel in the data which is to be output ultimately to become a color-visible pixel, determining in which pre-selected halftone dot pattern that pixel effectively lies and is associated as the contained subject pixel, and the output color intended for that pixel,...

The Examiner has, in both the First and in the Final Office actions, ignored this limitation of the claim, and has not applied any portion of the sole reference in explaining why the claim is rejected under 35 U.S. C. § 102(b). This renders the claim allowable over the applied art.

Claim 3 is allowable with its allowable parent claim.

Turning now to the rejection of claim 6, the rejection should be overturned because the Examiner has applied '477's technique of geometric look up tables to Applicant's provision of geometric pixel-pattern-specific dot patterns, which not instructive as to Applicant's method of the invention. The claim is allowable over the applied art for this reason alone.

The Examiner then applies '477 lookup table to Applicant's intensity correction value, which is clearly stated as deriving from the correction curve, which correction curve, and hence, which intensity correction value, is nowhere taught nor suggested by '477. Claim 6 is clearly allowable over the applied art.

A careful reading of Applicant's specification, claims and drawings, along with directing a closer look at the methodology actually described and illustrated in the cited and applied reference, will reveal that Applicant claims a calibration methodology which is dramatically different from the methodology described in the reference.

Ground B: Claim 4 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,943,477 to Rao *et al.*

Claim 4 is allowable with its allowable parent claim.

The Examiner's Response to Arguments:

With respect to the Examiner's contention that '477 discloses a calibration method dependent on "geometric considerations," while it true that '477 depicts geometric patterns which

appear similar to those used by Applicant, a careful reading and analysis of the Specification of the Application and of the reference will disclose that '477 examines patterns, generally in a 3x3 matrix, Applicant *compares* such patterns to a set of predetermined pixel patterns. Thus, while the picture look similar, the use is quite different.

Applicant continues to assert that there is nothing in '477 which addresses optical dot gain, as the Examiner has not provided any convincing argument or reference in '477 which teaches or suggests correction of optical gain.

Finally, the Examiner's Response on page 8 of the Final Office action continues the argument that the lookup tables contain Applicant's geometric pixel patterns, which is simply incorrect.

Having shown that the applied art does not teach nor suggest the appellant's invention as claimed, Appellants request that the Examiner's final rejection of these claims be reversed.

Customer Number

55428

Respectfully Submitted,

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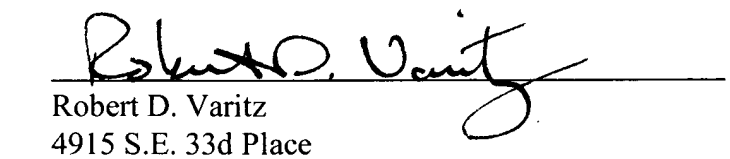

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8. CLAIMS APPENDIX TO APPELLANT'S BRIEF under 37 C.F.R. § 41.37 (c)(1)(viii)

The claims on appeal in the above-referenced application are reproduced hereinbelow as follows:

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Claim 1. A device-specific dot-gain reducing method for multi-level color-image halftoning regarding the output of a selected color-imaging multi-level halftone output device comprising

based upon observed pixel-infeed-to-halftoning-pixel-output operational characteristics of such a device, creating a pixel-and-color-specific dot-gain reduction curve which relates, as data points for each output color of the device, selected corrections in device pixel infeed intensity to different pre-selected, specific, halftone geometric dot patterns of plural pixels including a contained subject pixel which is to be output from the device, where those dot patterns include a predetermined geometric pixel arrangement possessing (a) a central pixel, which is the mentioned subject pixel, and (b) the presence or absence of a defined collection and geometric distribution of immediately neighboring pixels, and further where those patterns collectively represent the halftone dot-pattern population characteristics of an expected halftoned color image which is to be output by the device,

at a point in the image-processing flow of a stream of color-image pixel data which is upstream from the region where color-image device outputting takes place, and downstream from where halftoning of that data occurs, and for each pixel in the data which is to be output ultimately to become a color-visible pixel, determining in which pre-selected halftone dot pattern that pixel effectively lies and is associated as the contained subject pixel, and the output color intended for that pixel, and then,

relevant to said determining, and in relation to such a determined halftone dot pattern, appropriately applying to the associated, contained subject pixel the created dot-gain reduction curve.

Claim 2. (CANCELED)

Claim 3. The method of claim 1 ~~2~~, wherein each pre-selected halftone dot pattern takes the form of a three-by-three matrix of pixels.

Claim 4. The method of claim 1, wherein the selected output device is a printer, and said creating is based upon densitometer inspections of such different pre-selected halftone dot patterns which have been printed by the printer as a group of plural, next-adjacent, same patterns, and wherein further, with respect to each such densitometer-inspected pattern, data points used to create the mentioned curve are determined by comparing (a) densitometer-perceived percentage-of-coverage readings that are taken of the printed output pattern with (b) the idealized geometrical-percentage-of-coverage of non-white pixels in the pattern.

Claim 5. (CANCELED)

Claim 6. A method for minimizing color-image halftone dot-gain in the output of a multi-level halftone color-imaging output device comprising

characterizing that device's halftone output, on a per-color basis, regarding geometric pixel-pattern-specific dot gain which can be related to device pixel-infeed intensity levels, and

from that characterizing, creating and then applying to throughput color-image files, on a pixel-by-pixel basis, a pixel-to-device infeed intensity correction value based upon geometric pixel pattern considerations, thus to minimize device-output dot gain.

9. EVIDENCE APPENDIX TO APPELLANT'S BRIEF under 37 C.F.R. § 41.37 (c)(1)(ix)

NONE

10. RELATED PROCEEDINGS APPENDIX TO APPELLANT'S BRIEF under 37 C.F.R. § 41.37 (c)(1)(x)

NONE

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